(11) (A) No. 1 138 912

(45) ISSUED 830104

(52) CLASS 273-161
C.R. CL. 26-204;
154-95

(51) INT. CL.^{3} A63B 59/12

(19) (CA) CANADIAN PATENT (12)

(54) IMPACT RESISTANT HOCKEY STICK AND METHOD OF MAKING SAME

(72) Harwell, Roy M., Jr.,
U.S.A.

(21) APPLICATION No. 360,488

(22) FILED 800918

No. OF CLAIMS 8

DISTRIBUTED BY THE PATENT OFFICE, OTTAWA.
CCA-274 (3-80)

ABSTRACT

A hockey stick is made to be impact resistant by applying a tubular braided sleeve of reinforcing material over the blade extending from the toe to a point on the elongated handle adjacent the heel of the blade. The tubular braided sleeve is placed in tension to reduce its diameter and cause it to embrace, surround and conform closely into the contours of the hockey stick. The tubular braided sleeve is then impregnated with a resin, cured and the ends ground to remove excess material at the toe and on the handle of the hockey stick.

1138912

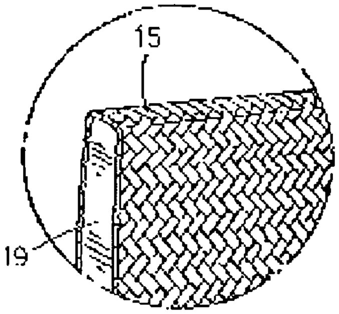

FIG.5

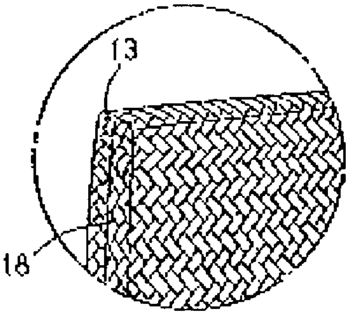

FIG.2

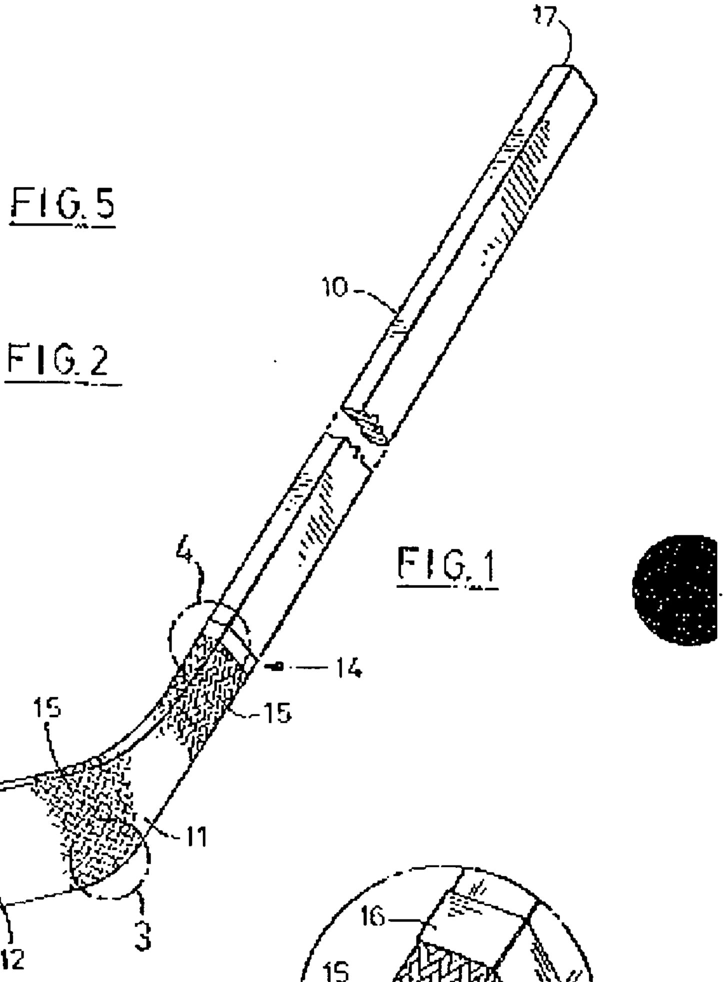

FIG.1

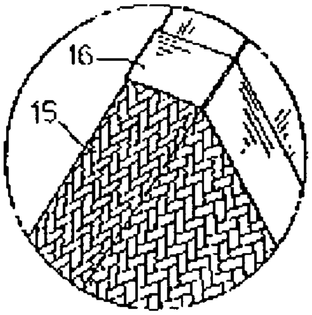

FIG.4

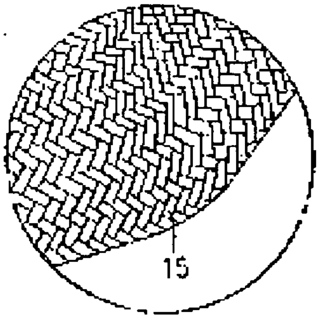

FIG.3

Ridout & Maybee
PATENT AGENTS

The present invention relates to a hockey stick and, in particular, to hockey sticks which are reinforced against impact and abrasion damage and to a method of making such hockey sticks.

For many years, it has been felt desirable to strengthen at least the impact area of hockey sticks with a material that will absorb the shock of a puck or ball striking there against and which will reinforce the hockey stick to prevent or reduce such breakage or tip splintering as normally occurs. One of the first attempts to so reinforce hockey sticks is disclosed in United States patent to Gardner et al, No. 2,912,245 in which a molded sleeve or cap is provided for strengthening purposes.

Canadian Patent to Villet, No. 591,454 issued January 26, 1960 discloses the use of glass fiber sheets bonded to the wooden surface of the impact area.

A further attempt to solve the problem is disclosed in United States patent to Traverse, No. 3,353,825 in which a textile sock having an open end and a closed end is knit, applied to the impact area of the hockey stick, coated with a synthetic resin material and cured in place to provide a reinforcement. This method, although superior to previous methods, suffers from the disadvantage that each individual sock must be separately knit, utilizing a toe closing operation which, as is well known in the textile industry, is time consuming and costly. Further, the invention disclosed in the Traverse patent is unsuitable for use on the new curved or shaped blades since the material tends to bridge a curved surface instead of closely conforming thereto.

Finally, of course, as is well known hockey players of all ages use tapes of a variety of forms to wrap around the impact area of hockey sticks in an attempt to provide a reinforcement. These tapes, however, are relatively weak and lack abrasion resistance and readily become worn and easily become dislodged from the hockey stick, thereby rendering the method useless.

The disadvantages of the prior art have, to a large extent, been overcome by the present invention which provides a strong, permanent, effective reinforcement for the impact area and handle/heel joint of a hockey stick.

In accordance with the present invention, an impact resistant hockey stick is provided, comprising a blade having a free toe end and a heel forming a transition between the blade and an elongated handle and a reinforcing layer comprising a cured, resin-impregnated braided tubular sleeve extending from a point on the elongated handle adjacent the heel to the toe of the blade, the sleeve completely embracing and surrounding the hockey stick along the entire length of the sleeve.

In accordance with a further feature of the invention, a method of making an impact resistant hockey stick having a blade with a free toe end and a heel forming a transition between the blade and an elongated handle is provided, comprising the steps of

(a) forming a braided tubular sleeve made from a fibrous material having a high abrasion resistance and a high tensile strength;

(b) stretching the braided tubular sleeve laterally in a direction normal to its tubular axis to expand its diameter;

(c) placing the tubular sleeve over the blade portion of a hockey stick so that it extends from a point on the elongated handle adjacent the heel, around the heel of the stick and slightly beyond the toe, completely embracing and enclosing the hockey stick over this extent;

(d) impregnating the braided tubular sleeve with a curable resin material, and

(e) curing the resinous material to firmly bond the braided tubular sleeve to the hockey stick.

Other important objects and advantages of the present invention will become apparent from the following detailed description of a preferred embodiment with reference to the accompanying drawings in which

Fig. 1 is a perspective view of a hockey stick embodying the present invention and reinforced in accordance with the method of the present invention;

Fig. 2 is an enlarged fragmentary perspective view of the toe portion of the hockey stick of Fig. 1;

Fig. 3 is an enlarged perspective view of the heel portion of the hockey stick of Fig. 1;

Fig. 4 is an enlarged perspective view of a portion of the handle of the hockey stick of Fig. 1, and Fig. 5 is a view similar to Fig. 2 showing an alternative embodiment of the invention.

Referring now to the drawings, the invention discloses, in Fig. 1, a hockey stick which may be of any one of conventional forms of construction comprising an elongated handle 10, a heel portion 11 which constitutes a transition portion between the elongated handle 10 and the blade 12, the blade 12 being provided with a free toe end 13.

The hockey stick of Fig. 1 is reinforced from a point 14 on the handle, adjacent the heel 11 to the free toe end 13 of the blade by means of an embracing and surrounding tubular braided sleeve 15 which is impregnated with a curable resin material in order to bond the braided tubular sleeve firmly and securely to the material of the hockey stick. In one embodiment of the invention, the braided, tubular sleeve has been closed by a line of stitching schematically illustrated at 18 in Fig. 2. The ends of the tubular braided sleeve 15 are ground or sanded smooth at the toe 13 of the blade as can clearly be seen in Fig. 2 so as to remove excess braided sleeve material. However, the braided sleeve material fully embraces the end face of the toe of the blade so as to completely enclose the blade at the toe end, thereby providing the toe with substantial reinforcement against abraison and impact, thus protecting this vunerable area of the blade. At the point on the handle adjacent the heel of the blade, the braided tubular material is also ground down smooth to merge with the material of the hockey stick. This ground or sanded area is then normally covered by a decorative and protective band such as illustrated at 16 in Fig. 4.

In an alternative embodiment of the invention, the toe end of the blade maybe ground so as to expose the material 19 of the blade itself as illustrated in Fig. 5 with the braided tubular sleeve 15 terminating flush with the end of the blade.

The method of making an impact resistant hockey stick of the kind illustrated in Figs. 1 to 4 will be described below with reference to these figures; it is considered unnecessary to provide additional drawings illustrating the various steps in the method which, to those skilled in the art, will be self-explanatory, from the description provided.

In making an impact resistant hockey stick of the kind described, a braided tubular sleeve is formed from fibrous material by a known, conventional textile manufacturing procedure which produces such braided textile articles. It is a characteristic of such a braided tubular textile sleeve that, if stretched laterally, in a direction normal to its tubular axis, the braided tubular sleeve is capable of substantial expansion. At the same time, the lateral stretching causes axial contraction of the sleeve.

Thus, the braided tubular sleeve is first stretched laterally in order to expand its diameter and contract its longitudinal dimension and the stretched tub is slid over the hockey stick either from the too of the blade or the extremity 17 of the handle. In order to produce the embodiment of the invention illustrated in Fig. 2, the braided tubular sleeve 15 is first closed with a line of stitching 18 which follows a slightly arcuate path to conform to the configuration of the end face of the toe 13 of the blade. The latterly expanded sleeve is then slipped over the blade from the toe end, slid along the blade, around the heel, and along the handle. Tension is applied to the braided tubular sleeve adjacent the the handle portion so as to cause it to completely embrace and enclose the hockey stick from the toe 13 to the point 14 on the handle. This causes the line of stitching 18 to lie close to the free end or toe of the blade and causes the tubular sleeve, throughout its extent to closely embrace and enclose the hockey stick. Tension is maintained on the sleeve during the subsequent manufacturing steps as will be described below.

According to another embodiment of the invention, the braided tubular sleeve is first stretched latterly in order to expand its diameter and is then slid over the hockey stick from the extremity 17 of the handle and one end of the braided tubular sleeve is secured to a point on the handle adjacent the heel. Conveniently, this point is illustrated at reference numeral 14 in Fig. 1 and the braided tubular sleeve may be secured at this point by any conventional mechanical means such as clamping, wrapping, strapping, stapling or the like.

The next step in the manufacturing process involves impregnating the tubular braided sleeve and stretching it axially so as to cause it to completely embrace and enclose the hockey stick from the point 14 to the toe 13 and to cause it to conform closely to the contours of the hockey stick. The successful practice of the invention does not require any particular sequence in these two steps. The braided tubular sleeve may be impregnated before it is longitudinally stretched to conform to the contours of the blade or, alternatively, the stretching operation may take place first and the stretched material may then be impregnated with the curable resin material.

The impregnating step may be accomplished by any known method such as dipping the entire stick and braided tubular sleeve in the appropriate material, by spraying the resinous material over the desired area, or by applying it in any other conventional and well recognized method.

As mentioned above, it is characteristic of tubular braided material that when stretched in a direction normal to the tubular axis, the diameter of the tub expands and the axial extent contracts. Conversely, when the braided tubular material is stretched axially, the diameter contracts and the length expands. Accordingly, the end of the braided tubular sleeve is grasped by any suitable clamping mechanism and a relatively strong tensile force is applied thereto. This causes the braided tubular material to contract in diameter along its length and to tightly and completely embrace and enclose the hockey stick from the point 14 to the toe 13. Preferably, the tubular braided sleeve is of a length sufficient, when stretched, the material extends beyond the toe 13. The excess material extending beyond the toe 13 is then held in this position, under tension, either by maintaining the stretching clamp in position, by tying the braided tubular sleeve immediately adjacent the toe end, by applying a clip or by stitching or by any other convenient method which will maintain the braided tubular sleeve under tension in its stretched condition in close embracing enclosing relation with the hockey stick and in tight conformity with all the contours of the hockey stick.

Thereafter, the resinous material with which the braided tubular sleeve has been impregnated is cured either by drying, heating or by any other method suitable to the resinous material that is employed. The molding apparatus may, if desired, be employed in order to impart a particular finish to the surface of the impregnated tubular material at the option of the manufacturer.

Finally, when the resinous material has been fully cured, a grinding or sanding operation is performed in order to remove excess material at the toe of the blade and the area 14 of the hockey stick is similarly ground or sanded in order to feather and merge the braided tubular sleeve with the material of the hockey stick so as to enable a protective and decorative band such as 16 shown in Fig. 4 to be applied.

The embodiment illustrated in Fig. 2, the sanding or grinding is carried out in such a manner as to remove excess braided tubular material extending beyond the line of stitching 18, but to leave the extremity of the toe of the blade covered by the braided material that is bonded thereto. This construction provides for a substantial reinforcement at a vunerable point on the hockey stick and prevents splitting and splintering of the toe of the blade.

As shown in Fig. 3, the braided tubular material will closely conform to the curvature of the hockey stick at the heel portion and will ensure that there is no bridging of the material over a concave surface and will cause tight adhesion and contact with the material of the hockey stick over the convex surface of the heel.

From the preceding description, it will be apparent that an improved and superior reinforced hockey stick has been provided in which a braided tubular sleeve is applied to the impact area of the hockey stick, impregnated with a resin, cured and finished in order to provide an impact resistant hockey stick of superior strength.

The invention is applicable to hockey sticks of a variety of manufacture and is independent of the construction of the hockey stick itself. Conventional hockey stick constructions include solid and laminated handles or shafts and solid and laminated blades with a variety of joints between the blade and the elongated handle. All of these constructions are contemplated within the scope of the invention as defined in the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. An impact resistant hockey stick comprising a blade having a free toe end and a heel forming a transition between the blade and an elongated handle and a reinforcing layer comprising a cured, resin-impregnated braided tubular sleeve extending from a point on the elongated handle adjacent the heel to the toe of the blade, the sleeve completely embracing and surrounding the hockey stick along the entire length of the sleeve.

2. An impact resistant hockey stick as claimed in Claim 1, wherein the ends of the sleeve at the toe of the blade and at the point on the elongated handle adjacent the heel are ground smooth to remove excess sleeve material at the blade toe and handle.

3. An impact resistant hockey stick as claimed in Claim 1 or Claim 2, wherein the resin-impregnated braided tubular sleeve is in tension between its two extremities.

4. A method of making an impact resistant hockey stick having a blade with a free toe end and a heel forming a transition between the blade and an elongated handle comprising the steps of:

a) forming a braided tubular sleeve made from a fibrous material resistant to abrasion and resistant to rupture under tension;

b) stretching the braided tubular sleeve laterally in a direction normal to its tubular axis to expand its diameter;

c) placing the tubular sleeve over the blade portion of a hockey stick so that it extends from a point on the elongated handle adjacent the heel, around the heel of the stick and slightly beyond the toe, completely embracing and enclosing the hockey stick over this extent;

d) impregnating the braided tubular sleeve with a curable resin material, and

e) curing the resinous material to firmly bond the braided tubular sleeve to the hockey stick.

5. A method of making an impact resistant hockey stick having a blade with a free toe end and a heel forming a transition between the blade and an elongated handle comprising the steps of:

a) forming a braided tubular sleeve made from a fibrous material resistant to abrasion and resistant to rupture under tension;

b) stretching the braided tubular sleeve laterally in a direction normal to its tubular axis to expand its diameter;

c) placing the tubular sleeve over the blade portion of a hockey stick so that it extends from a point on the elongated handle adjacent the heel, around the heel of the stick and slightly beyond the toe, completely embracing and enclosing the hockey stick over this extent;

d) securing the braided tubular sleeve to the elongated handle, exerting tension on the sleeve at the point extending beyond the toe of the blade to cause the braided tubular sleeve to reduce in diameter so as to tightly embrace and enclose the hockey stick and to conform closely to the contours of the hockey stick;

e) impregnating the braided tubular sleeve with a curable resin material, and

f) curing the resinous material to firmly bond the braided tubular sleeve to the hockey stick.

6. A method of making an impact resistant hockey stick having a blade with a free toe end and a heel forming a transition between the blade and an elongated handle comprising the steps of:

a) forming a braided tubular sleeve made from a fibrous material resistant to abrasion and resistant to rupture under tension;

b) stretching the braided tubular sleeve laterally in a direction normal to its tubular axis to expand its diameter;

c) placing the tubular sleeve over the blade portion of a hockey stick so that it extends from a point on the elongated handle adjacent the heel, around the heel of the stick and slightly beyond the toe, completely embracing and enclosing the hockey stick over this extent;

d) securing the braided tubular sleeve to the elongated handle, exerting tension on the sleeve at the point extending beyond the toe of the blade to cause the braided tubular sleeve to reduce in diameter so as to tightly embrace and enclose the hockey stick and to conform closely to the contours of the hockey stick;

e) tying or sewing the braided tubular sleeve immediately adjacent the free toe end of the blade of the hockey stick to maintain the tension in the braided tubular sleeve and to enclose the free extremity of the toe of the blade;

f) impregnating the braided tubular sleeve with a curable resin material, and

g) curing the resinous material to firmly bond the braided tubular sleeve to the hockey stick.

7. A method of making an impact resistant hockey stick having a blade with a free toe end and a heel forming a transition between the blade and an elongated handle comprising the steps of:

a) forming a braided tubular sleeve made from a fibrous material resistant to abrasion and resistant to rupture under tension;

b) stretching the braided tubular sleeve laterally in a direction normal to its tubular axis to expand its diameter;

c) placing the tubular sleeve over the blade portion of a hockey stick so that it extends from a point on the elongated handle adjacent the heel, around the heel of the stick and slightly beyond the toe, completely embracing and enclosing the hockey stick over this extent;

d) securing the braided tubular sleeve to the elongated handle, exerting tension on the sleeve at the point extending beyond the toe of the blade to cause the braided tubular sleeve to reduce in diameter so as to tightly embrace and enclose the hockey stick and to conform closely to the contours of the hockey stick;

e) sewing the braided tubular sleeve immediately adjacent the free toe end of the blade of the hockey stick to maintain the tension in the braided tubular sleeve;

f) impregnating the braided tubular sleeve with a curable resin material;

g) curing the resinous material to firmly bond the braided tubular sleeve to the hockey stick, and

h) thereafter grinding or sanding the braided tubular sleeve at its ends so as to cause it to smoothly merge with the material of the hockey stick on the handle and to remove excess sleeve material extending beyond the toe of the blade.

8. A method of making an impact resistant hockey stick having a blade with a free toe end and a heel forming a transition between the blade and an elongated handle comprising the steps of:

a) forming a braided tubular sleeve made from a fibrous material resistant to abrasion and resistant to rupture under tension;

b) sewing a line of stitching transversely across the braided tubular sleeve in a direction normal to its tubular axis and along a slightly arcuate line conforming to the configuration of the toe of the blade;

c) stretching the braided tubular sleeve laterally in a direction normal to its tubular axis to expand its diameter;

d) placing the tubular sleeve over the blade portion of a hockey stick so that the line of stitching in centred on the free end of the toe of the blade and so that the sleeve extends from the toe of the blade, around the heel and to a point on the elongated handled adjacent the heel, completely embracing and enclosing the hockey stick over this extent;

e) exerting tension on the sleeve at the point on the elongated handle adjacent the heel to cause the braided tubular sleeve to reduce in diameter so as to tightly embrace and enclose the hockey stick and to conform closely to the contours of the hockey stick;

g) impregnating the braided tubular sleeve with a curable resin material;

h) curing the resinous material to firmly bond the braided tubular sleeve to the hockey stick, and

i) thereafter grinding or sanding the braided tubular sleeve at its ends so as to cause it to smoothly merge with the material of the hockey stick on the handle and to remove excess sleeve material extending beyond the toe of the blade.